



POWER FROM WITHIN

DIRES CONTROLLER



USER MANUAL



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1. General information

This document describes the technical and functional features and how to use the E60020936XXXX electronic resistor.

2. General features

The electronic resistor implements the function of a motor potentiometer; it is completely controlled by a micro-controller and it uses a R-2R operation logic. A relay is used to toggle the resistances, thus allowing a complete insulation either from power and from digital or serial control lines. Eight toggling relays allow 256 adjustment levels. **The minimum attainable resistance value, whichever the resistor's rated value, is set at approx 5 ohms, (for the 640 ohms version) and at 20 ohms (latter versions).**

Five versions are provided, with rated resistance values ranging from **640 ohms to 1.3 kohm, 2.6 kohm, 5 kohm and 10 kohm**. Linearity and monotonicity of each are granted. Each increase/decrease step linearly increases or decreases 1/256 of the rated resistance value.

The modular housing allows installation on a DIN guide.

3. Input voltage

Connector **J3** is used for power input; input voltage can be either 12 or 24 VDC, with a self-rearming internal fuse. The device is protected by input polarity switching.

The maximum current absorption is approximately 80 mA at a voltage of 10V. The input voltage range is between 7.5 and 32 VDC.

Configuration:

- **J3 – PIN 1:** positive power input
- **J3 – PIN2:** negative input

4. Controls and function

Connectors and controls layout shown in the drawing in par. **Error! Reference source not found.**

4.1 Digital inputs

The resistor is controlled via three, optically insulated, digital inputs (connector **J2**). To control, connect the relevant input terminal to the insulated positive. There are a total of 5 contacts:

- **PIN 1 of J2** **COMMON:** common negative for optoinsulated inputs
- **PIN 2 of J2** **SPARE:** not used, for future uses
- **PIN 3 of J2** **RESET:** resets the resistor to its set value via the TR2 trimmer

- **PIN 4 of J2** **DOWN:** decreases the resistance value
- **PIN 5 of J2** **UP:** increases the resistance value

When switched On and after each reset, the resistor always reaches the value set via the TR2 trimmer. By activating the UP and DOWN controls, it is possible to either increase or decrease the resistance value, up to the maximum and minimum values adjustable via TR3 and TR4. Every activation of an UP or DOWN control produces a one step variation of the resistance value; keeping the control pressed produces a continuous increase/decrease, with the speed set by the TR1 trimmer (command value/duration line ramp).

4.2 Output

The device output, i.e. the actual variable resistor, is between **PIN 1** and **PIN2** of the **J1** connector. No set polarity on output.

4.3 Adjustments

Four settings can be adjusted on the device using the trimmers on the front:

- **TR1 - RAMP:** command value/duration increment line ramp; it is equivalent to the resistance speed increment/decrement when the relevant controls are enabled. It can be adjusted from 1 step in 3 seconds up to 1 step in 13 ms (approx 4 secs for the complete range). Turning clockwise raises the increase speed.
- **TR2 – RESET:** resistance value after a RESET command or when activated; it ranges from the MIN to the MAX value.
- **TR3 - MIN:** minimum value attainable with the DOWN command; turning the trimmer clockwise increases the minimum value
- **TR4 – MAX:** maximum value attainable with the UP command; turning the trimmer clockwise increases the maximum value

To get the full range, MIN must be turned fully counter-clockwise and MAX fully clockwise. In the abnormal condition of the set MIN resistance value exceeding the MAX value, the signal LED blinks at approx 0.5 secs and the resistor, after an increase or decrease command, sets to a fixed value.

The resistance value range can be adjusted observing the position of the relevant trimmers; the limits (minimum and maximum) are directly proportional to the angles of rotation of the relevant trimmers, in relation to the resistor rated value. The RESET trimmer adjusts the default value; the adjustment is linear between the MIN and MAX values set (ex. with trimmer in the middle of its range, there is the intermediate value halfway between MIN and MAX).

To fine-tune the range, proceed as follows:

- turn RAMP (TR1) fully clockwise
- set the MAX value to Zero (TR4 fully counter-clockwise)
- set the MIN value full scale (TR3 fully clockwise); **the LED blinks at ½ sec rate**
- perform a RESET (or switch the device Off and then On again)

This allows the output resistance to reach the device max rated value; then, proceed as follows:

- using an ohm-meter measure the output resistance; operate and maintain the decrease (DOWN)
- **very** slowly turn MIN (TR3) counter-clockwise until you reach the minimum required resistance range. When falling below the required value, re-adjust TR3 clockwise, de-activate the DOWN command and activate the increase (UP) command for a few seconds in order to have the value raising; repeat this step
- de-activate the DOWN command; activate and maintain the UP command
- **very** slowly turn MAX (TR4) clockwise; when the LED stops blinking the resistance value starts increasing. Turn clockwise until you reach the maximum required range value. In case you go over this value, readjust TR4 clockwise, deactivate the UP command, activate the DOWN command for a few seconds and repeat this step.
- disable all commands and reset; turn the RESET (TR2) trimmer and reset again; repeat until you reach the required resistance value.
- adjust RAMP (TR1) until you reach the required increase/decrease response speed.
-

4.4 Signalling

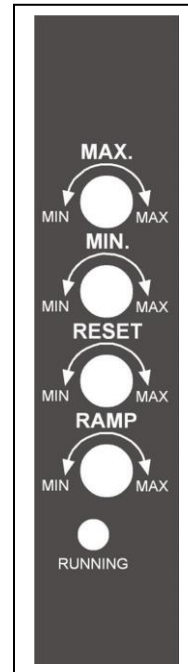
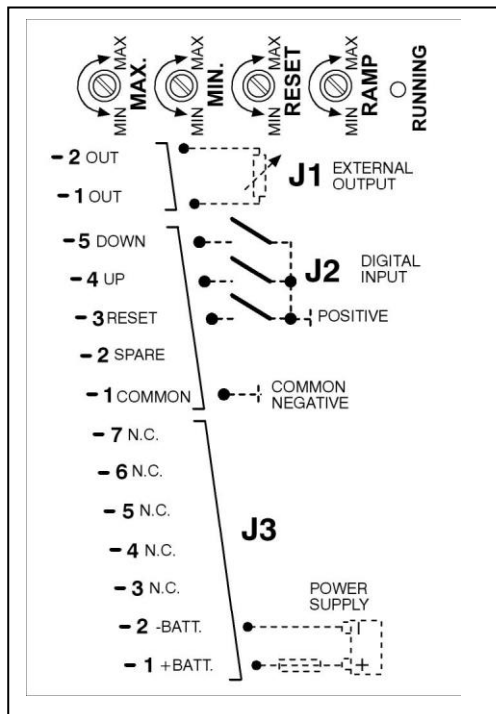
A Green LED is provided on the front; it blinks increasingly with the increasing resistance value.

5. Serial control lines

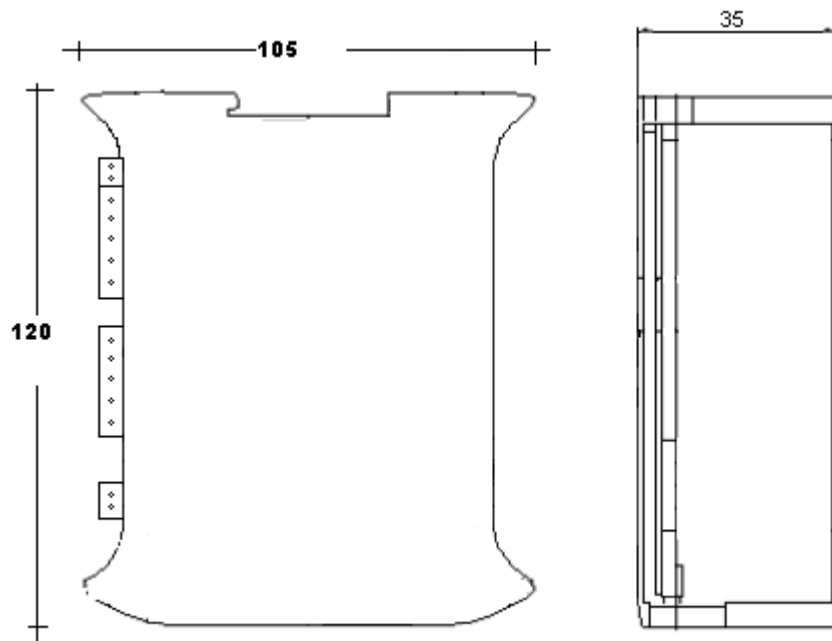
No RS485 or CANBUS interface connections provided at present.

- J3 PIN 3 SPARE
- J3 PIN 4 SPARE
- J3 PIN 5 SPARE
- J3 PIN 6 SPARE
- J3 PIN 7 SPARE

6. Connections chart



7. Dimensions



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